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ESI-50L Communications Server

Hardware Installation Manual

0450-1159
Rev. C

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Important: For information concerning the **programming** of an **ESI-50L Communications Server**, see the *ESI-50L Programming Manual* (ESI document # 0450-1137).

Overview

Cabinet components

The ESI-50L's cabinet components[1] consist of the standard **Base Cabinet** and an optional **Expansion Cabinet**. The ESI-50L can accept one Expansion Cabinet.

Base Cabinet

The ESI-50L **Base Cabinet** is designed for easy installation and component access. The Base Cabinet, which measures 8.5″ W × 11″ H × 3″ D, houses a main board with a built-in 482 card, as well as the Memory Module, Network Services Processor (NSP), one multi-purpose serial port, an MOH connector, an additional port card slot (see "Port card," *below*), and an external wall-mounted power supply.

Expansion Cabinet

The ESI-50L's optional Expansion Cabinet contains two port card slots, providing a total system capacity of three port cards (in addition to the built-in 482 card).

Main board

The ESI-50L main board combines leading-edge hardware components — including a Motorola® ColdFire® processor and DSP structure — along with proprietary operating system software. The board provides: system control of the Memory Module and port cards; a standard RS-232C DB9 serial port; a built-in modem for remote access; an external paging-device interface; MOH interface; and an NSP, which provides remote access via TCP/IP and supports certain optional ESI PC software applications.

Memory Module

The **Memory Module** — a CompactFlash® with **proprietary formatting** — contains all system programming and configuration data, and pre-loaded voice prompts. The Memory Module provides voice storage at 64 kilobits per second — the industry's highest-quality sampling rate — and has a voice storage capacity of 15 hours.

Power supply

The ESI-50L's 3-amp, 24 VAC power supply is included at purchase.

Port card options

Whether built-in or external, each 482 card[2] provides circuits to connect up to four loop-start CO lines, eight Digital Feature Phones, and two analog station ports. The CO line ports support standard CO and Centrex loop-start lines; ground-start CO lines are not supported. Only one analog device can be connected to each analog station port. This card uses 10 station ports and four CO ports when installed.

Notes: The main board comes in a four-line, eight-digital station, two-analog port configuration. You can add three 482 port cards on an ESI-50L. Therefore, the system can have the following configurations.
- **4 × 8 × 2:** Base Cabinet (main board only)
- **8 × 16 × 4:** Base Cabinet with one additional 482 port card.
- **12 × 24 × 6:** Base Cabinet with one additional 482 port card and an Expansion Cabinet with one 482 port card.
- **16 × 32 × 8:** Base Cabinet with one additional 482 port card and an Expansion Cabinet with two 482 port cards.

[1] Memory Modules and port cards are packed separately and are mounted in each system's cabinet during installation.
[2] The external 482 card also is used by the ESI-50L, the ESI C-Plus, and IVX S-Class Generation II systems.

NSP

Built into the main board, the **NSP (Network Services Processor)** serves as a bridge between an Ethernet-based network and the ESI-50L. Using TCP/IP, the NSP communicates directly with specific PC applications for maintenance of, and integration with, the ESI-50L.
The NSP manages optional features such as *VIP* and phone control via TAPI PC applications; it also provides access to not only maintenance and administration (through use of *ESI System Programmer* software) but also an Installer-selectable SMDR interface.

The NSP hardware interface consists of a dedicated Ethernet port. Its external RJ-45 jack provides a 10/100Base-T connection to the LAN. The NSP consumes no call-processing ports.

> **Note:** The ESI-50L provides one Ethernet port for access to the NSP.

Phones

Digital phone models

The ESI-50L supports several different models of **ESI digital phones**, each of which connects to the cabinet via standard two-wire twisted pair:

- **48-Key Digital Feature Phone** — Three-line, 56-character[1] display (backlit display available); speakerphone; headset jack[2]; 30 programmable feature keys; the only one of the three Digital Feature Phones that supports *VIP* or the 60-Key Expansion Consoles.

> **Note:** Not all modular headsets will work on the 48-Key Feature Phone's headset jack. ESI has tested and can recommend the following headset models:
>
> **Manufacturer:** Plantronics
> — P51-U10P sound tube microphone
> — P51N-U10P noise-cancelling microphone
> — P251-U10P sound tube microphone
> — P251N-U10P noise-cancelling microphone
>
> **Manufacturer:** GN Netcom
> — GN2120 NCD 01 "over-the-head"
> — GN2127 NCD 01 "on-the-ear"
>
> Note that GN Netcom models also are available in a "-02" configuration, which wires differently and **won't** work with ESI phones. Therefore, when ordering GN Netcom headsets for use with ESI phones, **be sure to specify the "-01" configuration.**

- **24-Key Digital Feature Phone** — Two-line, 32-character display (backlit display available); speakerphone; 12 programmable feature keys.
- **12-Key Digital Feature Phone** — One-line, 16-character display; nine programmable feature keys.

> **Note:** When a desktop phone is in the highest upright position, use the wall-mount hook located under the handset to secure the handset when you're not using the phone.

ESI Cordless Handsets

The ESI-50L also supports ESI's digital **Cordless Handsets**. Each comes in two sizes — small and large — and includes four familiar fixed feature keys, four programmable feature keys, and a headset jack. The Base Station for each ESI digital Cordless Handset uses a standard line cord and is line-powered.

Expansion Consoles

The **60-Key Expansion Console** gives a designated user 60 additional programmable feature keys. The Expansion Console is connected to its host 48-Key Feature Phone via a special cable (provided) and **doesn't** require a separate station port of its own. Additionally, it may be connected to a **60-Key Second Expansion Console** via a special cable (provided with the 60-Key Second Expansion Console) so that one 48-Key Feature Phone can have a total of 150 programmable feature keys.

A maximum of four stations with one or two Expansion Consoles (60-Key and 60-Key Second) can be installed in a **fully configured** ESI-50L system.

---

[1] The top two lines each have 16 characters, as on the 24-Key Digital Feature Phone; the bottom line has 24 characters.
[2] Headset jack only on 48-Key Feature Phones (Digital, Digital TAPI, [local] IP, or Remote IP) manufactured after March, 2004.

Feature Phone overlays

Each Feature Phone comes with one overlay for the programmable feature keys. To order additional overlays, visit the DESI™ Web site, **www.desi.com**. While there, you may also want to download the free *Windows*-based software, *DESI Lite*, which allows you to print on the overlays. For assistance with DESI products, contact DESI (the DESI Web site contains contact information).

> **Tip:** Remember that *ESI System Programmer*, *ESI Personal Programmer*, and *VIP* — software titles all available from **www.esiresellers.com** — also let you print on the overlays as well as perform many other programming tasks.

Licensing

There are various types of **licenses** needed to activate certain features and functionality. The following features, products, and capabilities require license activation:

- *VIP*.
- *VIP Professional*.
- *VIP PC Attendant Console*.

License activation

To have licenses activated by ESI Technical Support:

1. Licenses must already have been ordered from ESI.
2. The ESI Communications Server must have **either**:
   - A CO line connected to it;
     or
   - The NSP, which is connected to a LAN with a public IP address, "port-forwarded"[1] to it.
3. You'll need the following to provide to the ESI representative:
   - The ESI sales order number.
   - The customer (site) name.
   - The phone number of the CO line or the public IP address of the NSP.
   - The quantity of *VIP Professional* licenses.

[1] For more information about the NSP, refer to *NSP Installation Made Simple* (ESI #0450-0669).

System capacities

> **Important:** For comparison's sake, these include the ESI-50 as well as the ESI-50L.
>
> Each ESI Presence Management RFID Reader uses one digital station. The same is true for each ESI Cellular Management Access Device.

Stations and trunks

The specifications shown below reflect maximum capacities and configurations. **Not all station and trunk maximums can be reached simultaneously.** (See "System capacities" in the *ESI Communications Servers Hardware Installation Manual*, ESI document # 0450-1049.)

	ESI-50L	ESI-50 *(for comparison)*	
Dialing plans (-digits) ►	**Three**	**Four**	**Three**
Max. port cards[1]	4	4	4
Max. port configuration[2]	56	87	87
– Max. stations	40	52	52
– Max. IP stations	—	12	12
– Max. digital stations	32	32	32
– Max. analog stations	8	8	8
Max. CO lines	16	35	35
Max. DLCs (T1/PRI)[3]	—	1	1
Max. IVCs[4]	—	1	1
Max. Esi-Link port cards (up to 24 Esi-Link channels[5] per card)	—	1	1

Dedicated ports

	ESI-50L	ESI-50 *(for comparison)*	
Dialing plans (-digits) ►	**Three**	**Four**	**Three**
Voice mail/auto attendant ports	4	6	6
Conference ports (max. of 16 members per conference)	16	16	16
NSP[6]	1	1	1
Overhead paging ports	1	1	1
Serial/SMDR ports	1	1	1

Voice mail capacities

	ESI-50L	ESI-50 *(for comparison)*	
Dialing plans (-digits) ►	**Three**	**Four**	**Three**
Voice mail storage (hours)	15	15 or 60	15 or 60
Broadcast mailbox (one to all extensions)	Yes	Yes	Yes
Cascade notification mailboxes	10	10	10
Group mailboxes/max. members	16/32	16/32	16/32
Guest/info mailboxes	190	190	190
Maximum station mailboxes	40	52	52
Q & A mailboxes	10	10	10

[1] Includes built-in 482 port card.
[2] Includes Esi-Link channels.
[3] The ESI-50 supports only PRI.
[4] IVC 12 is built into ESI-50 main board; supports up to 12 local IP or up to eight remote IP channels.
[5] Esi-Link channels are allocated to "reserved" ports; i.e. Esi-Link channels do not reduce CO or station capacity.
[6] Network Services Processor.

Departments

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
Max. departments	10	10	10
Department types: Ring-all, ACD, UCD, in-order, pick-up, attendant	Yes (except ACD)	Yes	Yes
Max. members, non-ring-all depts.	32	32	32
Max members, ring-all depts.	32	32	32

Shared-office tenanting

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
Tenants	—	2	2

CO line groups

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
Line groups 9, 8, 71–76	Yes	Yes	Yes
Max. members, CO ring assignment list	32	32	32

Translation tables

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
PRI pilot numbers	—	10	10
Max. DID entries	—	300	300

System speed-dial numbers

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
System speed-dial numbers	100	100	100

Maximum installations of *VIP* applications

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
Installations, *VIP PC Attendant Console*	2	2	2
Installations, *VIP* auto-recording	4	4	4
Installations, *VIP ACD Supervisor*	—	2	2

ESI Presence Management features

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
RFID Reader access door records	10,000	10,000	10,000
RFID Reader entries in Function 372[1]	16	16	16
Max. RFID tags (“electronic keys”)	500	500	500

ESI Cellular Management features

Dialing plans (-digits) ▶	ESI-50L	ESI-50	
	Three	Four	Three
Support for ESI Cellular Management	Yes	Yes	Yes

[1] See the *ESI-50L Programming Manual* (ESI document #0450-1137) or the *ESI Presence Management Installation Manual* (ESI document #0450-0792).

Cautions and regulatory information

Cautions

> **Important:** This information complies with the requirements of Underwriters' Laboratories (UL) and UL Standards 1950, 60950, and 60950-1, as applicable.

When using this telephone equipment, always exercise basic safety precautions in order to minimize the risk of fire, electric shock or injury to persons. **Before proceeding, please read the following:**

- **Do not** use liquids or aerosols to clean any system equipment; rather, use a cloth that is only **slightly** damp.
- An ESI Communications Server contains **no** components that are serviceable by either non-Resellers or non-manufacturer technicians. **All service must be referred to the Reseller for further handling.**
- **Do not** install the cabinet in areas with extreme heat or improper ventilation.
- Install the cabinet **only** in "low-traffic" or "non-public" areas.
- To reduce the risk of fire, use **only** 24 AWG or larger telecom wire.

Power supply

Heed all warnings and instructions in documentation or marked on the cabinet or peripheral equipment.

Fuse

Contact the factory **before** attempting to replace the fuse. The fuse is located on the main board in the Base Cabinet.

Battery (located on the main board)

> **"Caution:** There is a danger of explosion if the onboard lithium battery is incorrectly replaced. Replace only with Ray-O-Vac BR1225 (or equivalent). Dispose of used batteries according to the battery manufacturer's instructions."

> **"Notice:** This product is intended to be supplied by a Listed Direct Plug-In Power Unit marked 'Class 2' and provided with electrical ratings."

Regulatory information

United States of America

Registration

The CO line telephone numbers, FCC registration number, and ringer equivalence number (REN) of this equipment must be provided to the telephone company before installation. (See below for FCC registration number and ringer equivalence number.)

FCC Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and — if not installed and used in accordance with the instruction manual — may cause harmful interference to radio communications (in which case, the user will be required to correct the interference at his/her own expense).

FCC Part 68

This equipment complies with Part 68 of the FCC Rules. On the bottom of this equipment is a label that contains, among other information, the FCC Registration Number and Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your telephone company.

The REN is helpful to determine the quantity of devices you say connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all, areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices you may connect to your line, as determined by the REN, you should contact your local telephone company to determine the maximum REN for your calling area.

If your telephone equipment causes harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, the telephone company will notify you in advance but, if advance notice is not practical, you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC.

Your telephone company may make changes to its facilities, equipment, operations or procedures that could affect the proper functioning of your equipment. If so, you will be notified in advance, to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, the telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Installation: The device is equipped with a USOC connector.
Registration Number: 1T1MF08B33727.
Ringer equivalence number (REN): 0.8

Hearing-aid compatibility

This equipment, utilizing telephone station equipment manufactured by ESI, meets all FCC requirements for hearing-aid compatibility.

Hardware installation

Site location

As with most electronic equipment, the environmental considerations for this site need to observe good common sense. Provide a dry, clean, and accessible area.

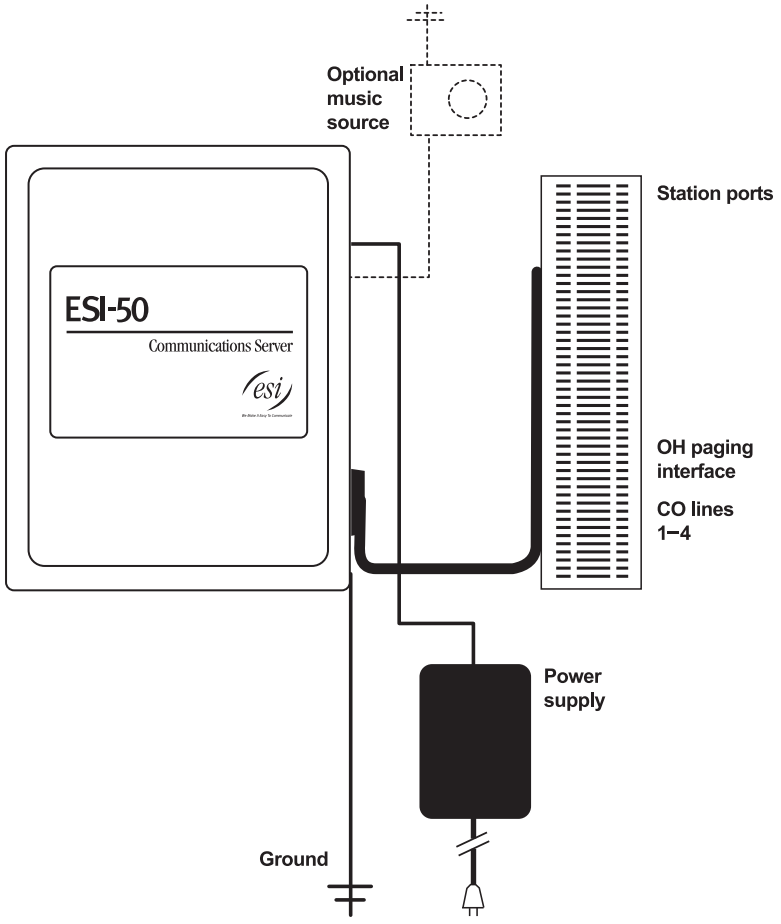
Locate space in the telephone equipment room, which will provide easy connection to the 66 blocks and 110 VAC power. **The location should be no further than 1,000 feet from the farthest station.**

Ambient room temperature must be 40^0 –80^0 (F.), and relative humidity no higher than 90%.

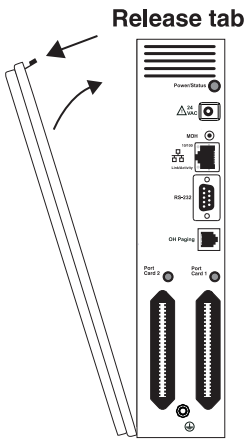
> **Notes:** **Do not** place the equipment or run station cabling near high voltage electrical equipment or electrical lines susceptible to high voltage surges from air conditioner compressors, etc.
>
> **Do not** mount the equipment in a place that receives direct sunlight.

The system and supporting components should be mounted to a half-inch (or thicker) plywood backboard. Here is the layout of a typical Base Cabinet installation.

ESI-50 Base Cabinet typical installation



Opening the Base Cabinet



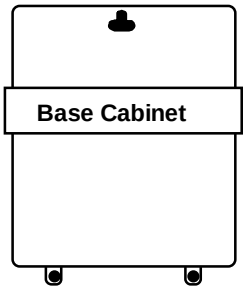
The lid on the Base Cabinet is held in place by two tabs that rest in slots in the bottom of the case, and a release tab that snaps into an opening in the top-center of the cabinet and is secured by a retaining screw.

To remove the lid:

1. Remove the retaining screw and depress the release tab at the top of the cabinet.
2. Rock the lid back from the top.
3. Lift and pull the lid free from the slots in the bottom of the cabinet.

Mounting the Base Cabinet

To mount the ESI-50 Base Cabinet, use the three provided #8 Phillips screws. Note the position of the three mounting holes in the cabinet. Allow room for installation of the Expansion Cabinet (see "Expansion Cabinet" installation, *below*) either now or, if required, in the future.



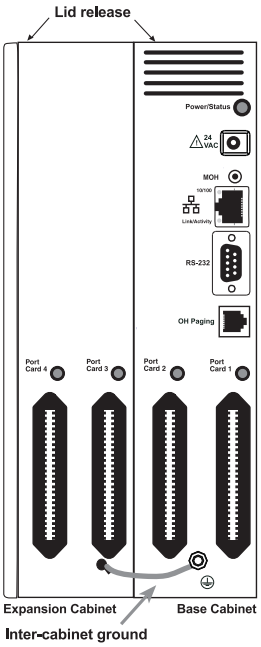
1. Screw in the top screw to the backboard (at least half-inch thick plywood) leaving about one-eighth-inch clearance between the screw head and the plywood.
2. Hang the unit using the keyhole at the top of the case.
3. Level the unit and install the bottom two screws.

Attach the power transformer to the wall, allowing sufficient length in both cords to reach the power connector on the upper right side of the cabinet and to reach a UPS or a dedicated 110 VAC outlet.

Expansion Cabinet installation

The Expansion Cabinet allows the ESI-50L's capacity to grow by up to two additional port cards. The cards are connected via ribbon cables, through the opening in the back of the Expansion Cabinet, to the Base Cabinet.

> **Note:** You can add only one Expansion Cabinet to an ESI-50L.



To install an Expansion Cabinet:

1. Wear a grounding strap and avoid unnecessary movement while handling the circuit boards.
2. Unplug the power to the ESI-50L system.
3. Remove the Base Cabinet lid by pressing the release tab at the top of the cabinet and rock back the lid from the bottom of the cabinet.
4. Install the Expansion Cabinet on the front of the Base Cabinet in place of the Base Cabinet's lid.
5. Lock the Expansion Cabinet to the Base Cabinet by snapping the top in place and reinstalling the retaining screw.
6. Connect the grounding strap from the Expansion Cabinet's grounding lug (located on the bottom of the cabinet) to the Base Cabinet's grounding lug. (See also "Grounding instructions," page G.1).
7. Through the large opening in the back of the Expansion Cabinet, connect the ribbon cable(s) from the port card(s) to the card directly below.
8. Re-install the original lid from the Base Cabinet on the face of the Expansion Cabinet.

Port card installation

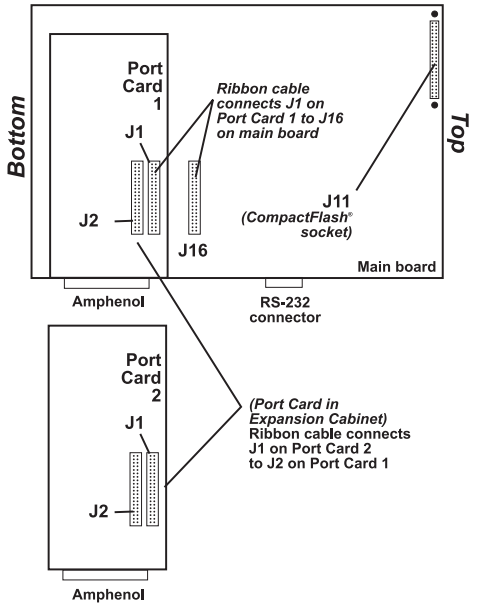
Adding or replacing port cards will require the system to be taken out of service (the ESI-50L doesn't support "hot-swapping" of its port cards).

Important: The ESI-50L can use **only** the 482 port card (see "Port card options," page A.1).

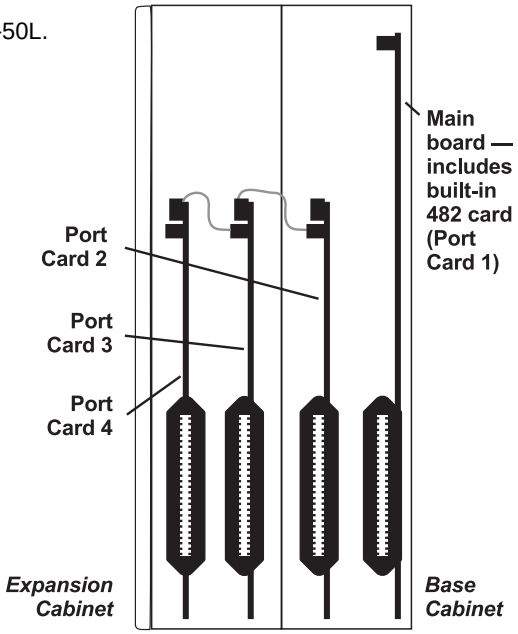
ALWAYS power down the system BEFORE adding or replacing any hardware. Also, be sure to observe all proper procedures regarding the prevention of electrostatic discharge (ESD) when performing the following procedures; otherwise, circuit boards may suffer damage.

Whenever you change the port card configuration, you **must** create a **backup file** for the new configuration to be able to perform the Restore function later.

1. Remove the locking screw at the top of the Base Cabinet, securing the cover, and remove the top cover by pressing down the locking tab and pulling the top cover forward.
2. Connect the first port card by inserting the ribbon cable from **J1** on the port card to **J16** on the main board.
3. Secure the port card with the five screws that came with the port card to the standoffs that came with the Base Cabinet.
4. If you're installing a second port card, secure the second port card to the Expansion Cabinet, using the screws provided with the port card.
5. Connect the second port card by inserting the ribbon cable from **J1** on the port card to **J2** on the first port card (located in the Base Cabinet).
6. Attach the Expansion Cabinet to the Base Cabinet, and secure with the locking screw at the top of the Base Cabinet.
7. Secure the lid to the KSU and/or Expansion Cabinet.
8. Reverse the steps to remove the port card. **Remember to power down the system before replacing parts.**



The diagram at *right* shows the configuration of a fully loaded ESI-50L.



Memory Module installation or replacement

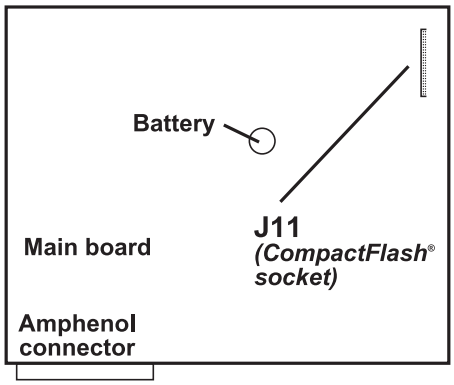
> **Note:** The Memory Module has a **proprietary** formatting scheme — **do not** attempt to install a non-ESI drive. Contact ESI for a replacement Memory Module, if needed.

Adding or replacing the CompactFlash Memory Module will require that the ESI-50L be taken out of service. **All of the system's configuration data and customer recordings are stored in the Memory Module.** Replacing it, therefore, requires re-programming and re-recording, unless you have previously performed a backup using *ESI System Programmer* software. (Prompts stay intact, however.)

> **Note:** Be sure to observe all proper procedures regarding the prevention of electrostatic discharge (ESD) when performing the following procedures; otherwise, circuit boards may suffer damage.

Install the Memory Module

1. Open the lid of the cabinet (you must remove the screw on the top that secures the lid).
2. Power down the system.
3. Plug the Memory Module into the **J11** connector on the main board (see diagram, *right*).
4. Secure the lid to the KSU.



Remove the Memory Module (if replacing)

1. Open the lid of the cabinet (you must remove the screw on the top that secures the lid).
2. Power down the system.
3. Remove the Memory Module from the **J11** connector on the main board (see diagram, *above*).
4. To install the Memory Module, follow the steps in "Install the CompactFlash Memory Module," *above*.

LED functions

The unit's various LEDs are designed to provide visual feedback as follows:

- The **Power** LED is located on the right side of the Base Cabinet, and is illuminated when power is being applied to the system. This LED blinks periodically to indicate that the main processor is operational.
- The **Port** LEDs are located above their respective connectors on each installed port card. Each LED is illuminated when any port on its associated port card is in use.

> **Note:** Disconnecting a connector when its respective LED is lit will disconnect any of its ports that are in use.

Upon power-up, approximately five minutes are required for the system to configure. The **Power** and **Port** LEDs will blink three times to indicate that the power-up sequence has been completed.

ESI Presence Management installation

For information on installing ESI Presence Management, see its *Installation Manual* (ESI # 0450-0792).

ESI Cellular Management installation

For information on installing ESI Cellular Management, see its *Installation Manual* (ESI # 0450-1155).

External connections

Grounding instructions

System grounding (supplemental ground) is as follows:

- The conductor wires can be no smaller than the ungrounded branch-circuit supply conductors (usually 16-gauge or higher).
- Acceptable wire: bare **or** covered with green (or green-and-yellow-striped) jacket.
- Conductors (and power receptacles) shall connect to earth ground at the service equipment (usually a cold-water pipe or copper ground rod).
- The supplemental ground must: be used regardless of power cord ground, be connected to the ground lug on the bottom of the cabinet, and retain ground connection when the power supply module is unplugged.
- Connect the grounding lugs of all units to system ground

> **Note:** ESI Communications Server lines are protected against a 10 KV surge **only** if the earth ground procedures described above are followed.

Power

Each cabinet requires a 110 VAC outlet (if possible, a dedicated outlet). Use **only** the Class-2 power supply module provided. A clean, isolated power source in conjunction with a UPS is **STRONGLY** recommended.

A fully loaded ESI-50L system (one Base Cabinet, one Expansion Cabinet) consumes 72 watts.

If AC power is interrupted, the system will drop all connections. When power is restored, the system will resume normal operation in approximately five minutes, having retained its full programming and clock setting.

UPS

For system protection and to maintain uninterrupted operation, an uninterruptible power supply is **STRONGLY** recommended.

For the ESI-50L, the recommended UPS minimum rating **per installed cabinet** is 125 VA.

Refer to the particular UPS unit's specifications to determine expected backup duration during a power outage.

> **Note:** The remaining information under "UPS" comes from *Technical Update* #216.

Most people have heard about UPSs, but seem to think that there is just one kind of device that goes by that name. In fact, there are several different major designs in use by today's major UPS manufacturers. These makers share much of the blame for confusing UPSs' end users by, far too often, lumping different designs under the "UPS" name.

(Continued)

UPSs can first be broken down into **system types**:

- **Stand-by** — A very simple design that affects power only when either a lag/brownout occurs below, or a spike/surge occurs above, a certain threshold. When either occurs, the unit trips — *i.e*., goes into battery mode. This "cleans" the voltage and helps to keep any load safe. Industry average "trip" times are 2–8 ms. No other filtration of AC power is performed.
- **Line interactive** — Constantly monitors inbound voltages, and uses special circuitry to boost low voltages and clamp high voltages without having to use the batteries. Indeed, the batteries are used only if the input voltage drops below acceptable levels (typically about 12% below normal), goes out completely or rises to dangerous levels (typically about 14% above normal) at which components will be damaged if line voltage is not removed. Industry average transfer time is 1–3 ms. (If voltage stays within its normal window, this unit continues to pass voltage, unaltered, from the wall.)
- **On-line** (or *full on-line*) — Constantly filters the power and performs a function known as double conversion (AC to DC to AC). This assures that the load — in this case, phone equipment — will receive not only uninterrupted, true sine wave output but also the cleanest, steadiest power possible throughout any foreseeable power disruptions or voltage irregularities. According to industry specs, it is not unusual for these types of units to be able to regulate utility power, even when it drops to 27% below or rises to 33% above normal, all without using their batteries.

From this point, UPSs can be further broken down by inverter types, which determine output. These are:

- **Square wave**.
- **Modified sine wave** (or *quasi sine wave*).
- **Sine wave**.

Most devices with wall-mounted chargers, such as cordless drills or screwdrivers, can behave erratically — sometimes not allowing the charge circuit to engage at all — when operating with modified sine or square wave inverters. Small wall-based transformer-style power supplies, similar to those ESI phone systems use, can experience overheating problems with modified sine or square wave outputs, which occur while some UPSs are operating in battery mode. This overheating could eventually cause damage to the power supplies; and, in time, the damage could cause a spike through the phone system — seriously damaging some of the static-sensitive components inside the casing.

While the **true** sine wave UPS output power curve smoothly increases to its peak, then smoothly decreases (allowing connected loads and equipment to operate the same as they would from utility supplied wall power), the **modified** sine wave and square wave UPS output power curve will shoot straight up, level off at peak voltage and then drop straight down. Additionally troublesome is that the modified sine wave sits at zero voltage for a short period during the transition to or from batteries — which is the main difference between it and the square wave output of some UPS. Please note that this short interval during which the modified sine wave UPS sits at zero voltage can directly affect the transfer time of the UPS and could, theoretically, be enough to cause the phone equipment to reset or even “freeze.”

Though it is hard to predict exactly when different ESI systems will have problems with modified sine wave or square waveform UPSs (meaning during a power failure event or the recovery from one), it’s fair to assume that a problem will eventually arise from the use of such UPSs. **Therefore, ESI recommends that only true sine wave output UPSs provide backup power to our phone systems and equipment.**

MOH port

The MOH (messages-, or music-, on-hold) connector — located on the Base Cabinet's right side — is a standard $^{1}/_{8}$″ monophonic mini-jack, used for loading custom MOH recordings or for playing live music-on-hold from an external source such as a CD player.

Maintenance/SMDR serial port

The **Maintenance/SMDR** port is a standard DB9 female serial connector, located on the Base Cabinet's right side. Use a standard shielded serial cable, DB9-to-DB9, for printer-to-computer; this is usually male-to-female.

> **Note:** The maximum distance from the cabinet is 100 ft.

The output from the Maintenance/SMDR port is, 8 data bits, 1 stop bit, and no parity. The pinout is:

Data Transmit	Pin 2
Receive	Pin 3
Ground	Pin 5

To program this port, use Function 18 as described in the *ESI-50L Programming Manual* (ESI #0450-1137).

Range: Programmable for 300, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, or 115,200 bps.
Default: 38.4K.

Maintenance

Connect a PC (such as a laptop) to the port to perform on-line programming and diagnostics. Also, the system sends reports to this port.

SMDR

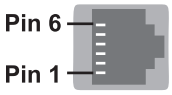
The ESI Communications Server continuously outputs real-time SMDR call records to the port.

> **Note:** The system will buffer up to 1,000 SMDR records in non-volatile memory when the **Maintenance/ SMDR** serial port is in use for programming or uploading (such as during use of *ESI System Programmer*). If the buffer becomes full, the system will discard the oldest records.

For more information about the Maintenance/SMDR port, see "SMDR" in the *ESI-50L Programming Manual* (ESI #0450-1137).

External paging device connection

A dry-contact overhead-paging device can be connected through the RJ-11 **OH Paging** connector, which is located on the front of the main board faceplate just below the NSP's Ethernet connector. Although this is a six-pin connector, only two pairs are needed between the paging device and the connector:



- To pin-out the connector for **normally open** operation, connect the **audio** wires to **pins 3 and 4** and the **control** pair to **pins 1 and 2**.
- To pin-out the connector for **normally closed** operation, connect the **audio** wires to **pins 3 and 4** and the **control** pair to **pins 5 and 6**.

Dry-contact control

The manner in which the dry-contact pair is punched down on the 66 block sets the pair as normally open (sending a page to the port will close the contacts) or normally closed (sending a page to the port will open the contacts).

Connect the dry-contact pair of the device to the ESI Communications Server as follows:

- Terminals 35 and **36** to provide normally **open** operation;
  or
- Terminals 36 and **38** to provide normally **closed** operation.

The port can be used with zone paging units.

> **Note:** ESI doesn't recommend the use of paging contacts for door-unlocking mechanisms.

Programming

To access the overhead paging port, assign feature code **5 9 9** to a programmable feature key.

Amphenol cable connections

Connect a standard 66 or 110 block to each digital port card by using a male 50-pin amphenol cable to each port card female connector located on the cabinet. The connector closest to the wall is the first card; on other ESI Communications Servers, the connector in the leftmost slot is the first card.

CO line connection

Local loop

An ESI Communication Server's advanced CO line circuitry provides for open loop detection and the system's built-in Caller ID interface. Loop start lines are connected via the last four pairs on each 66 block on the 482 card.

> **Note:** Observe correct order of connection to preserve proper rotary hunting of the CO lines.

Station connection

Each 482 port card (built-in or external) supports up to eight digital stations and up to two analog devices.

All stations are connected using a single pair. Each port position is pre-numbered and fixed as indicated in the 66 block wiring diagram shown for each port card type.

> **Note:** The station runs can be up to 1,000 ft.

Digital stations

Digital stations for the ESI Communications Server include:

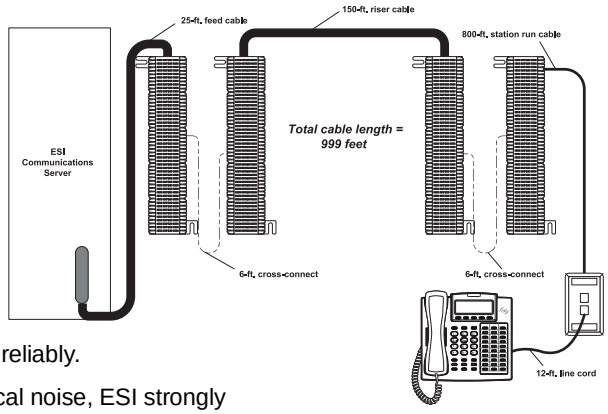
- ESI Digital Feature Phones
- ESI Digital Cordless Handsets
- ESI Presence Management RFID Readers[1]

The digital station wiring is not polarity-sensitive. Only one phone can be connected per digital port. The station line voltage is 33 VDC.

For proper operation, the combined length of feed cables, backbone cabling, cross-connect, and station cable must not exceed 1000 feet (304 meters) for digital stations. Station line cord length should not exceed 12 feet (note that this is the length of the line cord ESI provides with each Digital Feature Phone).

Each digital station can have no more than two cross-connects or splices in the cable distribution. Cable construction, termination blocks, and modular jacks must meet **at minimum** Category 3 cabling requirements. Additional splices or terminations will further reduce the maximum cable length at which the digital station will operate reliably.

Example of recommended cabling for ESI digital instruments



Because of potential interference caused by electrical noise, ESI strongly recommends against distribution of digital stations with analog stations or other circuits in the same cable binder or station run.

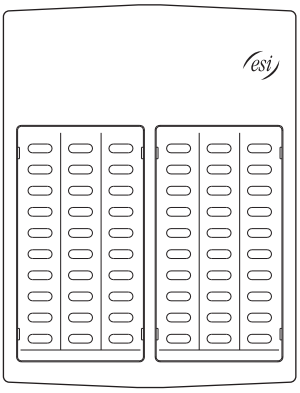
Analog ports

The analog ports do not require that tip-and-ring polarity be observed. The analog ports can be used for 2500-type sets or for devices such as fax machines, modems, etc., that can be connected via a normal tip-and-ring pair. Each analog port will support only a single analog device. The ESI-50L supports a maximum of eight analog devices. All analog ports provide Type I Caller ID information (Caller ID with call waiting is not supported).

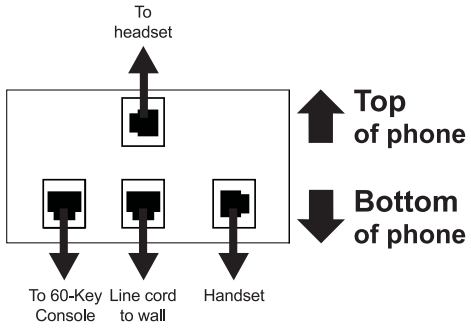
[1] For information on installing ESI Presence Management, see its *Installation Manual* (ESI # 0450-0792).

60-Key Expansion Console connection

> **Notes:** The 60-Key Expansion Console can be connected to only a 48-Key Feature Phone.
>
> If connecting both a 60-Key Expansion Console and a 60-Key Second Expansion Console to a 48-Key Feature Phone, see "60-Key Second Expansion Console connection," page G.7.



1. The 60-Key Expansion Console *(right)* includes an **expansion cable**. Connect one end of the expansion cable to the appropriate connector on the bottom of the Feature Phone *(below)*. Then, connect the other end of the expansion cable to the 60-Key Expansion Console.
2. To keep cabling out of the way, thread the expansion cable into the slots on the bottom of the phone and 60-Key Expansion Console.
3. Program the keys on the 60-Key Expansion Console using the same procedure as with the Digital Feature Phone (press **PROGRAM 2**).
4. If necessary, remove the clear **plastic** overlay from the keys on the Expansion Console.
5. For the customer's convenience, label the **paper** overlay to show how the keys are programmed (we suggest you use *ESI System Programmer* for this).
6. Install the labeled **paper** overlay on the 60-Key Expansion Console.
7. Install the clear **plastic** overlay **over** the paper overlay, to protect it.
8. Use the provided Velcro® tape to attach the left side of the 60-Key Expansion Console to the right side of the 48-Key Feature Phone.

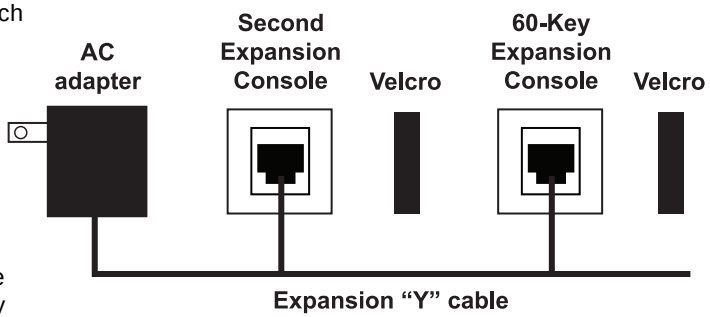


Connectors on bottom of 48-Key DIgital Feature Phone

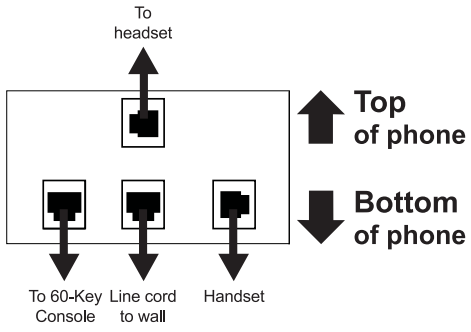
60-Key Second Expansion Console connection

> **Notes:** If connecting only one Expansion Console to a 48-Key Feature Phone, see "60-Key Expansion Console connection," page G.6.
>
> The 60-Key Second Expansion Console connects to the 60-Key Expansion Console and **cannot** connect directly to the 48-Key Feature Phone (the only phone to which you can connect a 60-Key Expansion Console).

1. The Second Expansion Console (which is physically identical to a 60-Key Expansion Console) includes an **expansion "Y" cable** *(right)*[1]. Lay out the cable across the back of the equipment so that the AC adapter is on left and the end of the cable is on the right.
2. Connect the **right** end of the expansion "Y" cable to the appropriate connector on the bottom of the 48-Key Feature Phone *(below)*.



3. Then, connect the expansion "Y" cable's **middle** plug to the 60-Key Expansion Console, the **left** plug to the Second Expansion Console, and the **AC adapter** to an appropriate 110 VAC outlet to provide power to the Second Expansion Console *(above)*.
4. To keep cabling out of the way, thread the expansion "Y" cable into the slots on the bottom of the phone and the two Expansion Consoles.
5. Program the keys on the two Expansion Consoles using the same procedure as with the Digital Feature Phone (press **PROGRAM 2**).
6. If necessary, remove the clear **plastic** overlay from the keys on the two 60-Key Expansion Consoles.
7. For the customer's convenience, label the **paper** overlay to show how the keys are programmed (we suggest you use the *ESI System Programmer* PC software application for this).
8. Install the labeled **paper** overlays on the two 60-Key Expansion Consoles.
9. Install the clear **plastic** overlays **over** the paper overlays, to protect them.
10. Use the provided Velcro® tape to attach the left side of the 60-Key Expansion Console to the right side of the 48-Key Feature Phone, and the right side of the 60-Key Expansion Console to the left side of the Second Expansion Console).



Connectors on bottom of 48-Key DIgital Feature Phone

[1] This diagram shows the backs of the Expansion Consoles.

Installing ESI's Cordless Handsets

Each ESI Cordless Handset comes with:

- A **charger/cradle** to charge the Handset.
- An **AC adapter** for use with only the charger.
- A **base station** to provide a digital interface between the ESI phone system and ESI Cordless Handset. This base station is line-powered and therefore needs **no** AC power.
- **Wall-mount**(s), a **belt clip**, and a ***Quick Reference Guide***.

Each ESI Cordless Handset is keyed to only one base station and takes up one digital port on a 482 card.

Base station installation

Due to each site's unique characteristics, the range and distance information we'll provide herein is only approximate.

Characteristics that **positively** affect performance:

- The base station should be installed so it has a clear line-of-sight with the Cordless Handset.
- The base station antenna should always be pointed in its uppermost vertical position.

Characteristics that **negatively** affect performance:

- Large amounts of metal shelving (such as in manufacturing or warehouse areas).
- Close proximity to (within one mile of) a radio tower.
- Concrete walls that divide spaces where Cordless Handsets are used (assuming the base stations are in one location).

Don't install the base station:

- Close to a wall with metal studs.
- On a metal wall.
- Next to a device that emits RFI or EMI[1] — *e.g.*, a television, radio, computer, computer printer, fluorescent light fixture, or fax machine.
- Next to any other 900 MHz device — *e.g.*, a hand-held inventory control device.
- In a ceiling that has foil-backed insulation.
- Behind doors that typically are closed, tinted windows, one-way glass, or other areas that limit or cut off transmission to the Cordless Handset.

Base stations must be installed at least 10 feet apart, regardless of whether the base station is for the small-model or large-model Cordless Handset. **Don't** install more than six base stations in one area (such as a network room). Choose a location at least 30 feet away if more than six base stations are needed in a building.

A **Digital** Cordless Handset base station requires only a line cord to the phone system; AC power **isn't** needed because the base station receives power from the phone system via the line cord.

Once the base stations are installed and the Cordless Handsets charged, change each Handset's channel by pressing its **CH** key. **Each Handset should have its own channel**. There are 30 available channels on the small Cordless Handset and 10 on the large Cordless Handset.

> **Note:** Feedback may result if the Cordless Handset is within three inches of an ESI desktop Feature Phone.

[1] *RFI* is radio frequency interference. *EMI* is electromagnetic interference.

In case of trouble

If you have followed the guidelines described herein and still encounter problems with ESI Cordless Handsets, please call ESI Technical Support at **800 491-3609** or e-mail to *techsupp@esi-estech.com*. When contacting ESI Technical Support, be sure to have as much of the following site and usage information as possible:

- Square footage of the building.
- Layout of building/offices, and locations of base stations. This can be a hand-drawn diagram with locations of base stations (you can fax it to ESI at **972 422-9705**; be sure to indicate that it goes to Technical Support). The objective is to give the ESI technician an idea of the site's layout.
- Number of large and small Cordless Handsets, and how many are of each type (the ESI-50L supports only digital models; other ESI Communications Servers also support local and remote IP models).
- How the troublesome Cordless Handset is being used. For example:
  - A large handset at the site may be used by a supervisor who travels the entire area of the building many times per day.
  - A small handset may be used only by an administrative assistant to go a short distance from an office to a copy room.
- Where the problem occurs — *e.g.*, if a Cordless Handset cuts in and out when used in a certain area of the building.

ESI Cordless Handset specifications

	Small Handset	Large Handset
Fully charged battery life	Approx. 7 hrs.	Approx. 10 hrs.
Recharge time	Approx. 5 hrs.	Approx. 5 hrs.
Standby time	Approx. 5 days	Approx. 4 days
Approximate range[1]	200 ft.	400 ft.
Weight (including battery)	5.2 oz.	8.8 oz.
Size, W × D × H (in.)	2 × 1.25 × 5.5 without antenna	2.2 × 1.67 × 8.67 with antenna

Accessories

ESI sells separately a headset for both ESI Cordless Handset models, and this is the **only** headset ESI supports for use with the ESI Cordless Handset.

For more information on accessories for the ESI Cordless Handset, refer to your appropriate *Price Schedule* or the *ESI Cordless Handset Product Overview* (ESI # 0450-0840).

[1] Interference may result if cordless base stations are installed within 10 feet of each other. Ranges are approximate, and are dependent on each site's unique characteristics. Feedback may result if the Cordless Handset is within three inches of the ESI desktop phone.

Port card connections

Term	Wire color	Signal	RJ11	Port
1	White-Blue	Data+	Green	Digital
2	Blue-White	Data-	Red	
3	White-Orange	Data+	Green	Digital
4	Orange-White	Data-	Red	
5	White-Green	Data+	Green	Digital
6	Green-White	Data-	Red	
7	White-Brown	Data+	Green	Digital
8	Brown-White	Data-	Red	
9	White-Slate	Data+	Green	Digital
10	Slate-White	Data-	Red	
11	Red-Blue	Data+	Green	Digital
12	Blue-Red	Data-	Red	
13	Red-Orange	Data+	Green	Digital
14	Orange-Red	Data-	Red	
15	Red-Green	Data+	Green	Digital
16	Green-Red	Data-	Red	
17	Red-Brown			
18	Brown-Red			
19	Red-Slate			
20	Slate-Red			
21	Black-Blue			
22	Blue-Black			
23	Black-Orange			
24	Orange-Black			
25	Black-Green	Tip	Green	Analog
26	Green-Black	Ring	Red	
27	Black-Brown	Tip	Green	Analog
28	Brown-Black	Ring	Red	
29	Black-Slate			
30	Slate-Black			
31	Yellow-Blue			
32	Blue-Yellow			
33	Yellow-Orange			
34	Orange-Yellow			
35	Yellow-Green			
36	Green-Yellow			
37	Yellow-Brown			
38	Brown-Yellow			
39	Yellow-Slate	Tip	Green	CO
40	Slate-Yellow	Ring	Red	
41	Violet-Blue	Tip	Green	CO
42	Blue-Violet	Ring	Red	
43	Violet-Orange	Tip	Green	CO
44	Orange-Violet	Ring	Red	
45	Violet-Green	Tip	Green	CO
46	Green-Violet	Ring	Red	
47	Violet-Brown			
48	Brown-Violet			
49	Violet-Slate			
50	Slate-Violet			

Cabinet worksheet

ESI-50L • Base and Expansion Cabinets

				Base Cabinet		Expansion Cabinet	
Term.	Wire color	Signal	RJ11	Pt. Crd. 1	Pt. Crd. 2	Pt. Crd. 3	Pt. Crd. 4
			Card type →	[Main board]	482	482	482
1	White-Blue	Data+	Green	Dig/Ana 100	Dig/Ana 110	Dig/Ana 120	Dig/Ana 130
2	Blue-White	Data-	Red				
3	White-Orange	Data+	Green	Dig/Ana 101	Dig/Ana 111	Dig/Ana 121	Dig/Ana 131
4	Orange-White	Data-	Red				
5	White-Green	Data+	Green	Dig/Ana 102	Dig/Ana 112	Dig/Ana 122	Dig/Ana 132
6	Green-White	Data-	Red				
7	White-Brown	Data+	Green	Dig/Ana 103	Dig/Ana 113	Dig/Ana 123	Dig/Ana 133
8	Brown-White	Data-	Red				
9	White-Slate	Data+	Green	Dig/Ana 104	Dig/Ana 114	Dig/Ana 124	Dig/Ana 134
10	Slate-White	Data-	Red				
11	Red-Blue	Data+	Green	Dig/Ana 105	Dig/Ana 115	Dig/Ana 125	Dig/Ana 135
12	Blue-Red	Data-	Red				
13	Red-Orange	Data+	Green	Dig/Ana 106	Dig/Ana 116	Dig/Ana 126	Dig/Ana 136
14	Orange-Red	Data-	Red				
15	Red-Green	Data+	Green	Dig/Ana 107	Dig/Ana 117	Dig/Ana 127	Dig/Ana 137
16	Green-Red	Data-	Red				
17	Red-Brown						
18	Brown-Red						
19	Red-Slate						
20	Slate-Red						
21	Black-Blue						
22	Blue-Black						
23	Black-Orange						
24	Orange-Black						
25	Black-Green	Data+/Tip	Green	Ana 108	Ana 118	Ana 128	Ana 138
26	Green-Black	Data-/Ring	Red				
27	Black-Brown	Data+/Tip	Green	Ana 109	Ana 119	Ana 129	Ana 139
28	Brown-Black	Data-/Ring	Red				
29	Black-Slate						
30	Slate-Black						
31	Yellow-Blue						
32	Blue-Yellow						
33	Yellow-Orange						
34	Orange-Yellow						
35	Yellow-Green						
36	Green-Yellow						
37	Yellow-Brown						
38	Brown-Yellow						
39	Yellow-Slate	Tip	Green	CO	CO	CO	CO
40	Slate-Yellow	Ring	Red				
41	Violet-Blue	Tip	Green	CO	CO	CO	CO
42	Blue-Violet	Ring	Red				
43	Violet-Orange	Tip	Green	CO	CO	CO	CO
44	Orange-Violet	Ring	Red				
45	Violet-Green	Tip	Green	CO	CO	CO	CO
46	Green-Violet	Ring	Red				
47	Violet-Brown	Tip	Green				
48	Brown-Violet	Ring	Red				
49	Violet-Slate	Tip	Green				
50	Slate-Violet	Ring	Red				

Note: Extension numbers shown are valid **only** if "100" flexible numbering template is in use.

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